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Evaluation of the stress-strain state of a one-dimensional heterogeneous porous structure

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Abstract

© Published under licence by IOP Publishing Ltd.The paper deals with the problem of determining the stress-strain state of the distal part of the pelvic girdle bones. The area was modeled using a rod loaded by a compressive force and was described by physical relations linking the stress-strain tensor through the elastic constants, the fabric tensor, and the solid volume fraction of the material. Taking into account the law of porosity variation, we considered the problem of evaluating the stress-strain state depending on the nature of the porous structure, and the relationship of the structure with mechanical macroparameters. In this work, we present the results of calculations for a single load, construct the diagrams for the components of the strain tensor, and carry out an assessment of deformations for various system parameters. To evaluate the macroparameters, we built the dependence of the Poisson ratio of the material on the rotation angle a and the pore ellipticity parameter λ. The sensitivity of the deformations to the elastic constants was also estimated.

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